

## **REMARKS**

### **A. Status of Claims**

Favorable reconsideration of this application as presently amended is respectfully requested. Claims 1, 3 through 7, 9 through 20, 22 through 26, 28 through 34, and 36 through 39 are pending. In this Amendment, Claim 1 has been amended and Claims 2, 8, 21, 27 and 35 have been canceled. Claim 39 has been added. No new matter is added by these amendments.

### **B. Restriction Requirement**

The Examiner has required a restriction between the following species:

Generic: Claims 1 through 8, 14 through 27 and 33 through 38

Species A: Claims 9 and 28, drawn to a plasma electrode including an object-to-be bonded holding electrode and a counter surface electrode

Species B: Claims 10 and 29, drawing to an RF plasma power supply

Species C: Claims 11 and 30, drawn to a pulsed-wave plasma power supply capable of adjusting a pulse width

Species D: Claims 12 and 31, drawn to a first and second low-pressure plasma emitting means

Species E: Claims 13 and 32, drawn to a low-pressure plasma and an atmospheric-pressure plasma

Applicant elects the claims associated with Species D, *with traverse*, i.e. claims 1, 3 through 7, 9 through 20, 22 through 26, 28 through 34, and 36 through 39, for prosecution in the instant application. Applicant reserves the right to file a divisional application for the subject matter covered by the remaining groups. The inventor for the invention of the elected claims is the same as the inventor of record in the application.

**C. Support for Amendments to Claims**

Support for the amendments to Claims 1 and 20 may be found, *inter alia*, in the specification at paragraphs [0014] through [0017], as well as elsewhere in the originally filed specification, drawings and claims.

Support for the amendments to Claims 14 and 33 may be found, *inter alia*, in the specification at paragraphs [0072], [0224] through [0226], as well as elsewhere in the originally filed specification, drawings and claims.

Support for the amendments to Claims 15 and 34 may be found, *inter alia*, in the specification at paragraphs [0227] through [0229], as well as elsewhere in the originally filed specification, drawings and claims.

Support for the amendments to Claim 39 may be found, *inter alia*, in the specification at paragraphs [0083], [0197], [0217], and [0251], as well as elsewhere in the originally filed specification, drawings and claims.

**D. Procedural Matters**

Applicant notes, with thanks, the Examiner's acknowledgment of receipt of papers submitted under 35 U.S.C. § 119.

Applicant notes, with thanks, the Examiner's acknowledgment of the acceptance of the drawings filed on June 2, 2006.

Applicant notes, with thanks, the Examiner's acknowledgment of the references provided in the Information Disclosure statement filed on June 2, 2006.

**E. Response to Nagakubo *et al* (USP 5,904,860)**

At Page 3 of the Office Action, the Examiner provides a statement as to the alleged teachings of the '860 patent. In order to expedite prosecution on this matter, Applicant has elected to discuss this reference in light of the pending claims even though there are no pending rejections of the claims.

**1. The Teachings of USP 5,904,860**

The '860 patent teaches that a first body is entirely made of nitride or at least the surface of the first body is covered with nitride. A terminating step, using hydrogen atoms, is started before a cleaning step completely finishes. And, the cleaning is performed using an ion beam (high energy beam). According to the '860 patent, dangling bonds of nitrogen atoms or oxygen atoms are created by etching stable nitride or oxide constituting an object to be bonded using an ion beam of inert argon gas, *i.e.*, a reaction gas. As may be seen, oxygen is not used as the reaction gas. In addition, an active oxygen ion is not supplied. Therefore, the dangling bonds created using the inert argon gas as a reaction gas are very unstable. This is because the energy is not supplied by this process. Thus, it is very easy to return to the original state as soon as the irradiation of the ion beam is stopped. As a result, a terminating step of using hydrogen atoms is started before the cleaning step is completed.

One additional drawback to utilizing the teachings of the '860 patent is that a high vacuum is necessary to generate an ion beam. This results in additional cost in constructing the apparatus.

**2. The Claimed Teachings of The Present Invention**

According to the present invention, as claimed, active oxygen ions are supplied proactively, thereby combining the oxygen ions with an object to be bonded. Therefore, an object to be bonded (except oxide or nitride) can be subjected to a hydrophilic treatment and due to such hydrophilic treatment, objects to be bonded can be bonded together. In addition, it is

possible to effectively perform hydrophilic treatment of Si, SiO<sub>2</sub>, glass, oxide, ceramics or the like by performing specific treatments of the presently claimed invention, *i.e.*, a physical treatment and a chemical treatment. This feature has never been achieved by prior art methods. This is neither taught or suggested by the '860 patent.

An additional advantage of the present invention is the use of plasma. By utilizing plasma, instead of an ion beam, a high vacuum is not needed. Therefore, it is possible to reduce the cost of constructing the apparatus in relation to ion beam devices.

If the Examiner has any questions or concerns regarding the present response, the Examiner is invited to contact Mr. Ajay A. Jagtiani at 703-591-2664, Ext. 2001.

**F. Conclusion**

In view of the foregoing, it is respectfully submitted that this application is in condition for allowance, and favorable action is respectfully solicited.

The Commission is hereby authorized by this paper to charge any fees during the entire pendency of this application including fees due under 37 C.F.R. §§ 1.16 and 1.17 which may be required, including any required extension of time fees, or credit any overpayment to Deposit Account 10-0233.

Respectfully submitted,

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